

Toxicity of non-tailpipe particles

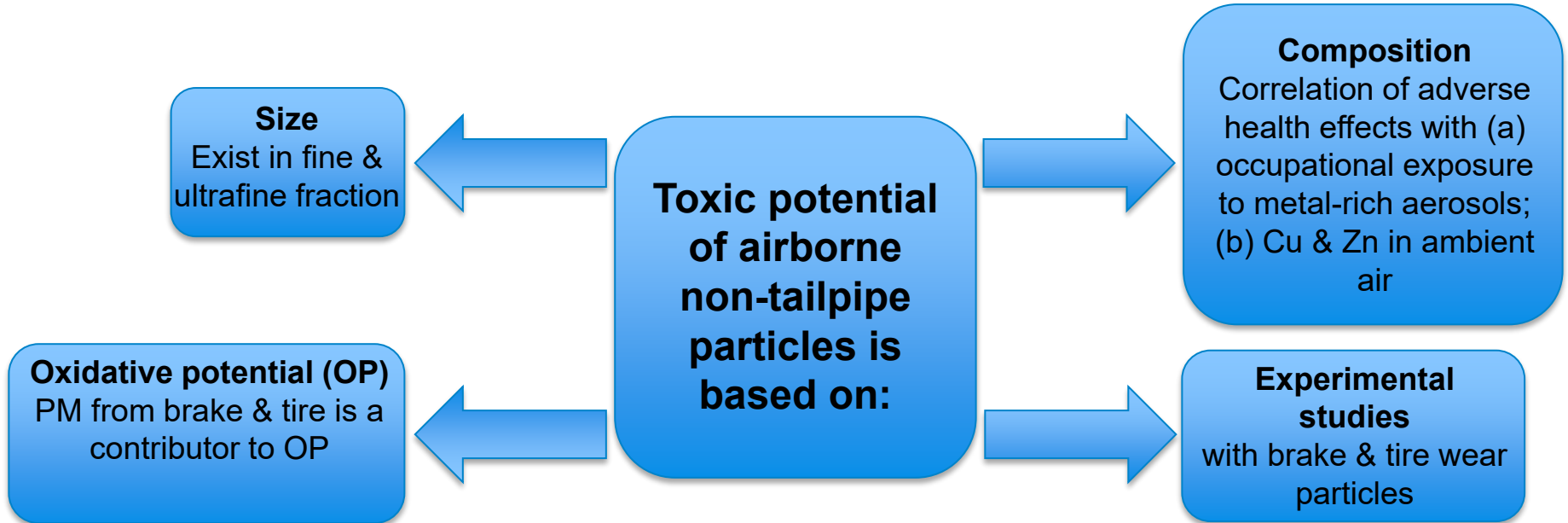
HEI Webinar 6: Non-tailpipe Emissions

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Toxicity of traffic-related PM

- Major focus has been on combustion derived particles
- Non-tailpipe particles have received less attention



Toxicity of airborne non-exhaust particles: experimental studies

Source material

Brake wear particles

- Different compositions
- Deceleration / full-stop

Tire tread particles (TP)

Tire & road wear particles
(TRWP)



Models

In vitro

- Human lung cells,
macrophages

In vivo

- Rodents; IT & inhalation



Main findings

Brake wear

- Inflammation, oxidative stress (OS); phagocytic deficit, mitochondrial dysfunction, DNA damage mutagenicity
- Toxic potential depends on composition (non-asbestos organic > low/semi-metallic content)
- Correlation with metal content (Cu, Ba, Ti)
- Can be as toxic as other particle sources (DEPs)

Tire wear

- TP: DNA damage; inflammation; OS
- TRWP: appears to be of low toxicity (NOAEL 112 $\mu\text{g}/\text{m}^3$ in rats)